Settlement patterns and territories over the long term from Prehistory to the Middle Ages

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Several projects, developed since the 1990s, provide the background for the ideas and questions on which this paper will focus. From the European programs 'Archaeomedes' I (1992-1994) and II (1996-1999) to the Archaedyn I project (2005-2007, ACI 'Spaces and Territories') and II (2009-2010), the object was to analyze the evolution of settlement patterns over a long period, from the Iron Age to the Middle Ages.

These successive programs provided a common protocol for comparing several areas located in the Rhône valley (*Archaeomedes*[1]) and, later on, in different parts of France: Center, North-East and South-East, as well as in Slovenia (*Archaedyn*[2]). The analysis of thousands of archaeological sites shows general trends related to the rhythm of settlement creation or abandonment, whatever the geographical or cultural and historical context (Fig. 1).

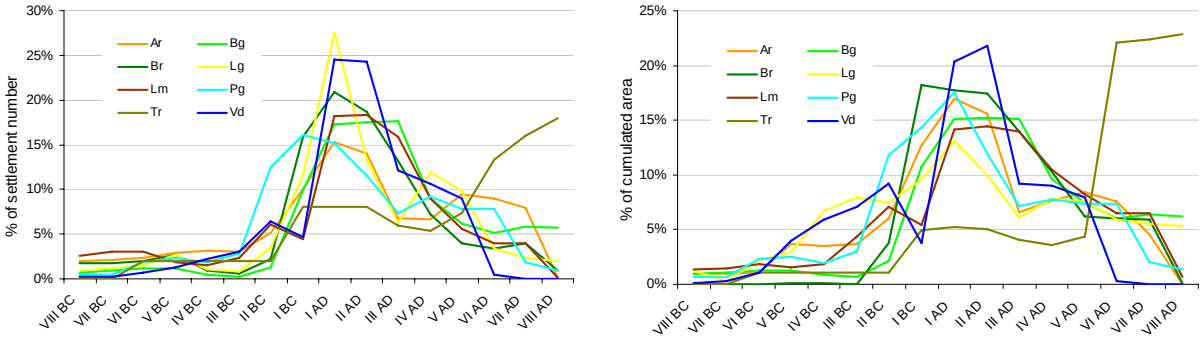

Figure 1 Quantitative evolution of the settlement in 8 French study areas / about 2000 settlements (see fig 1, Ar- Provence/Argens-Maures, Br- Berry/Champagne Berrichonne, Bg- Bourgogne/Vallée de l'Yonne, Lg- Languedoc/ Vaunage, Lm- Auvergne/Limagne, Pg- Provence/Préalpes de Grasse, Tr- Touraine/Neuvy le Roy, Vd- Provence/Verdon). Graph. L. Nuninger, F. Trément, Data [3], *ArchaeDyn, ACI Spaces and Territories, ET28, 2005-2007*.

Nevertheless, the detailed study of the hierarchical organization of the settlement shows different behaviors or/and a time-lag according to the areas. For example, considering the period from 2 BC to 2 AD, in two micro regions in Burgundy and in Languedoc (fig. 2, Lg and Bg): while the former presents a strong background with a progressive development of the settlement pattern, the latter is more chaotic with a high level of small and short-term creations. In the first case, it seems that local communities developed their settlement system by adapting to a well-established background. In the second case, the locals seemed to adapt their system in a more radical but less sustainable way, as a "start up effect". Based on our historical and archaeological information, both behaviors can be linked to an economic context. Vineyards were speculatively developed by Roman civilizations in the south of France, while in Burgundy, the external pressure of Roman demand was probably based on an existing and well-established system of local production (salt meat for example).

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[1] **Favory *et al.* 2003**. *Archéologie et systèmes socio-environnementaux. Études multiscalaires sur la vallée du Rhône dans le programme Archaeomedes*, CNRS Éditions, Paris ; **Nuninger *et al.* 2007**. From Archaeomedes to Archaedyn. In: Posluschny A., Lambers K., Herzog I. eds. − Layers of perception: Proceedings of the 35th CAA Conference, Berlin, Germany, April 2−6, 2007. Bonn (Germany): Habelt (Kolloquien zur Vor− und Frühgeschichte, vol. 10).

[2] **Bertoncello *et al.* 2008**. The spatio-temporal dynamic of settlement pattern from 800 B.C. to 800 A.D. in central and meridional Gaul : models for an inter-regional comparison on the long term, in Gandini C., Favory F. , Nuninger L. (eds.) *7 millennia of territorial dynamics : settlement pattern, production and trades, from Neolithic to Middle Ages*, pre-proceedings of the *ArchaeDyn* 2008 conference, Dijon 23-25 june., **Favory, Nuninger *et al.* 2008**. ArchaeDyn 2005-2007: ambitions, achievements and accomplishments, in Gandini C., Favory F. , Nuninger L. (eds.) *7 millennia of territorial dynamics : settlement pattern, production and trades, from Neolithic to Middle Ages*, pre-proceedings of the *ArchaeDyn* 2008 conference, Dijon 23-25 june

[3] Lm - B. Dousteyssier, M. Segard, F. Trément (Univ. Clermont-Ferrand 2, EA 1001); Br - C. Gandini (UMR 8546); Bg – P. Nouvel (UMR 6249); Lg - F. Favory, E. Fovet, L. Nuninger (UMR 6249), C. Raynaud (UMR 5140); Ar - F. Bertoncello, M. Gazenbeek (UMR 6130); Pg - L. Lautier (UMR 6130); Vd - D. Garcia, F. Mocci (UMR 6573); Tr - V. Hirn (UMR 6173).

By using classical statistics and models of interaction, descriptive overviews were made permitting us to hypothesize about the evolution of the settlement pattern over time in different locations[4]. However, there is no chance of validating these hypotheses since we have no information about the processes which created the trajectories of the studied areas and because we have to deal with several problems such as:

- The lack of data regarding economic flow, demography, political organization…;
- Dynamic vs. Snapshot, based on small settlements only because the higher range of settlements are described with criteria corresponding to their apex;
- The heterogeneity of time scales: settlement pattern observation (half a century minimum) vs. time and temporality of the human activities / of the historical events or on the contrary of the environment;
- The heterogeneity of space scales: we observe micro-regional behaviors responding to different stimuli (economic, social, politic, environmental) arising on several levels (neighborhood, region, empire…).

Taken together, these problems limit us to the description and observation of settlement pattern evolution at several periods of time with different levels of details. Even if our models consider interaction between settlements[5] or between settlement and environment for example[6], there is no possibility to study the interactions between factors (including social, economic, political or environmental relationships) which produce such patterns and are able to explain a part of the territorial dynamism. Therefore, the assumptions developed to explain the trajectory (increase/decrease) of one center or one area are: either 1) reductionist and deterministic (lack of resources, poor geographical location…) or 2) empirical as non formalized scenarios based on different data, analytical results or knowledge in which the problems of scales in space and times are usually avoided since a human brain has is own limits. Using simulation to reproduce the past is meaningless. However, while our work provides important series of real trends and patterns – as a set of references for a long term approach -, I find it worthwhile to go beyond the description and focus on "process to pattern", i.e. the pattern as study object. The expected result is a set of knowledge, a set of tools to read and explain archaeological facts (observed trends, changes…) with a new point of view and access to a better understanding of non-material evidence of the territory.

The work of the Archaedyn project, despite its "classical", i.e. descriptive approach, was carried out with this goal in mind[7]. The protocol adopted by the group offered a common framework for comparing chronological and spatial distributions by respecting at best the scale of the analyzed data. The systematic decomposition into unities of time and space qualified by archaeological attributes made it possible for the entire team to work out the elaboration of quantitative chronological systems of reference based on archaeological reality. It must be said that spatial archaeology is usually based on artifact/site distribution over space in which geographical space is usually considered as an attribute. This methodological positioning, which is natural for the archaeologist since he begins with his data, nevertheless quickly meets its limits when the different datasets of artifacts are compared. Attempting to characterize the sectors of space, as cells, by archaeological attributes, space itself becomes the object of study and the sectors of spaces become comparable elements between them. It is more worthwhile to evaluate the stability or the instability of the areas over time and to draw out the history of the geographical space.

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[4] **Nuninger, Sanders *et al.* 2006**. La modélisation des réseaux d'habitat en archéologie : trois expériences. *Mappemonde.* 2006. http://mappemonde.mgm.fr/num11/articles/art06302.html

[5] **Durand-Dastès *et al.* 1998**. *Des oppida aux métropoles*, *Archéologues et géographes en vallée du Rhône*, Anthropos (coll. Villes), Paris 1998, 280 p.; **Nuninger, Sanders *et al.* 2006** cf. n.4.

[6] **Berger *et al.* 2007**. Modeling the role of resilience in socio-environmental co-evolution: the Middle Rhône Valley between 1000 b.c. and a.d. 1000. In Kohler, T. A., Van der Leeuw S. (eds) - *The Model-Based Archaeology of Socionatural Systems*. SAR Press, Santa Fe., **Nuninger *et al.* 2007**, cf. n. 1.

[7] **Favory, Nuninger 2008**, cf. n. 2.